REMARKS

Claims 1-40 are currently pending in the present patent application. In the subject Office Action, the Examiner rejected claims 1 and 2 under 35 U.S.C. 102(b) as being anticipated by Kishimoto (U.S. Patent No. 5,422,462), since the Examiner asserted that Kishimoto teaches a heating apparatus (Fig. 1) having a heating element **1** selected from the group consisting of conductive polyaniline fiber, conductive polyaniline yarn comprising conductive polymer fiber (Col. 5, lines 22-34) and non-conductive substrate **2** supporting and electrodes **17**, **18** for passing a current through the heating element **1** the conductive polyaniline fiber **2**, the fabrics are woven fabrics. Applicants respectfully disagree with the Examiner concerning this ground of rejection for the reasons to be set forth hereinbelow.

Claims 3, 8-10, 12-13 and 27 were next rejected under 35 U.S.C. 103(a) as being unpatentable over Kishimoto in view of Adams et al. (WO 99/24991), since the Examiner stated that Kishimoto teaches substantially the claimed invention including a conductive polyaniline fiber inherently having a chosen diameter and chosen length, but does not teach a dopant, conductivity and peak stress. The Examiner continued that Adams et al. teaches a conductive polymer with dopant and characterized by as-spun conductivity of 90 ± 8 S/cm and as-spun peak stress about 60 MPa (Abstract and page 8, Example 4), and concluded that it would have been obvious to one having ordinary skill in the art to modify Kishimoto's invention to include a dopant in order that the conductive polyaniline fiber has a conductivity and peak stress to sustain a possible stretch as taught by Adams et al. (page 8, Example 4). Applicants respectfully disagree with the Examiner concerning this ground of rejection for the reasons to be set forth hereinbelow.

The Examiner rejected claims 4-7,21-26 and 35-40 under 35 U.S.C. 103(a) as being unpatentable over Kishimoto in view of Adams et al. and further in view of Pron et al. (U.S. Patent Application No. 2003/0091845), since the Examiner asserted that Kishimoto in view of Adams et al. teaches substantially the claimed invention including an electric power controlling circuit **11**, but does

not teach a deterioration of a conductivity of the conductive polyaniline fiber at certain temperatures, and that Pron et al. teaches the variations of reduced conductivity of polyaniline at different temperatures (Page 6, [100, 101]). The Examiner concluded that it would have been obvious to one having ordinary skill in the art to modify the invention of Kishimoto in view of Adams et al. in order to determine when and how the conductivity of the conductive polyaniline is reduced at different temperatures as taught by Pron et al. (Page 6, [100, 101]) and also at voltage or current and the diameter of the polyaniline as inherently capable of doing so by Kishimoto by an electric power controlling circuit **11**. Applicants respectfully disagree with the Examiner concerning this ground of rejection for the reasons to be set forth hereinbelow.

The Examiner rejected claim 11 under 35 U.S.C. 103(a) as being unpatentable over Kishimoto in view of Adams et al. and further in view of Mattes et al. (U.S. Patent Application No. 2004/0119187), since the Examiner asserted that Kishimoto in view of Adams et al. teaches substantially the claimed invention, but does not doping and redoping polyaniline fiber, while Mattes et al. teaches polyaniline fiber and a method of doping and redoping polyaniline fiber (Abstract). The Examiner then concluded that it would have been obvious to one having ordinary skill in the art to modify the invention of Kishimoto and Adams et al. to include doping and redoping polyaniline fiber in order to effect electrical and mechanical properties of polyaniline fiber as taught by Mattes (page 9, [95]). Applicants respectfully disagree with the Examiner concerning this ground of rejection for the reasons to be set forth hereinbelow.

Claims 14-15, 19-20, 28-29 and 33-34 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kishimoto in view of Adams et al., since the Examiner asserted that Kishimoto teaches substantially the claimed invention, but does not teach fiber stretching capabilities and sulfonic acid, while Adams et al. teaches a fiber stretched to between 5 and 8 times its original length (Page 7, lines 29-35 and Page 8, lines 5-10) and sulfonic acid (Abstract, lines 7-8). The Examiner then concluded that it would have been obvious to one having ordinary skill in the art to modify Kishimoto's invention to include sulfonic acid to act as a

solvating agent (Abstract, lines 4-5) and fiber having stretching capabilities to increase its conductivity as taught by Adams et al. (Page 7, lines 27-35, Page 8, lines 4-10).

The Examiner rejected claims 16 and 30 under 35 U.S.C. 103(a) as being unpatentable over Kishimoto in view of Adams et al. and further in view of Eiffler (U.S. Patent No. 5,188,76), since the Examiner asserted that Kishimoto in view of Adams et al. teaches substantially the claimed invention, but does not teach a molecular weight, while Eiffler teaches a polymer having a molecular weight more the 200,000 g/mol (Col. 9, lines 26-30). The Examiner concluded that it would have been obvious to one having ordinary skill in the art to include a molecular weight in the invention of Kishimoto in view of Adams et al. in order to prepare the polymer by anion exchange and cross-linking as taught by Eiffler (Col. 9, lines 26-30). Applicants respectfully disagree with the Examiner concerning this ground of rejection for the reasons to be set forth hereinbelow.

Claims 17-18 and 31-32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kishimoto in view of Han et al. (U.S. Patent No. 5,225,495) and further in view of Adams et al., since the Examiner asserted that Kishimoto teaches substantially the claimed invention, but does not teach ethyl acetate and phosphoric acid, while Han et al. teaches ethyl acetate (Col. 17, lines 65-67) and Adams et al. teaches phosphoric acid (Table, page 4). The Examiner concluded that it would have been obvious to one having ordinary skill in the art to modify Kishimoto's invention in order to include ethyl acetate as a solvent as taught by Han et al. (Col. 17, lines 40-45) and phosphoric acid as a solvent as taught by Adams et al. (Page 3, lines 16-25). Applicants respectfully disagree with the Examiner concerning this ground of rejection for the reasons to be set forth hereinbelow.

The Examiner cited U.S. Patent No. 6,541,744 and U.S. Patent No. 6,548,789 as being pertinent to applicants' disclosure, but did not apply these references to the subject claims. After reviewing these references, applicants believe that no further comment is required.

Briefly, the present invention includes the use of substantially homogeneous conductive PANI.AMPSA$_{0.6}$ fibers for resistive heating applications. Fibers were spun from a solution of a mixture of a chosen amount of polyaniline powder with 2-acrylamido-2-methyl-1-propanesulfonic acid (AMPSA) in dichloracetic acid (DCAA). Subsequent to spinning, the fibers were partially ion exchanged using phosphoric acid and then stretched, or stretched and dedoped and redoped with selected dopants.

Electrical current-induced destruction of conductivity for polyaniline fibers resulting from the application of a current characteristic of a particular conductive polyaniline fiber was observed at temperatures lower than the temperature at which dopant molecules in the conductive polymer are lost or decompose, or the temperature at which the polyaniline backbone decomposes. The temperature at which this effect occurs is dependent on the dopant and on the fiber diameter. Polyaniline fibers may therefore be used for resistive heating applications where the heating element is in the vicinity of the skin of a wearer thereof. It was also observed that when the electrical conductivity of the fiber has been substantially destroyed, the structural integrity of the fiber is preserved.

Turning now to U.S. Patent No. 5,422,462 for "Electric Heating Sheet" which issued to Yoshio Kishimoto on June 06, 1995, Col. 5, lines 23-49 state: "A polymer fiber coated with a conductive covering layer on the surface can also be used as a conductive yarn. This conductive yarn can lose its continuity after breaking its conductive covering layer due to sparks or heat generated by overheating. Polymeric compounds including conductive particles, conductive polymers, metal platings or the like are used for the conductive covering layer. Among these materials, it is most preferable to use conductive polymers such as polypyrrole, polythiophene and polyaniline, or metals of low melting points. In addition to organic fibers, it is preferable to use conductive wire **1** coated with insulating covering layer **6** as a yarn having insulating properties at least on its surface. The organic fibers include synthetic fibers such as polyester, polyethylene, polypropylene, polyvinylalcohol, aramide (aromatic polyamide), aromatic polyester, polyphenylenesulfide, polyimide, polyamide and the like.

Chemical fibers including rayon and the like, and natural fibers such as cotton, jute and the like can also be used for the yarn having insulating properties at least on its surface. These fibers can be used alone, mixed, combined or twisted with each other. These fibers can also be combined with conductive fibers, or conductive properties can be added to these fibers in the invention. (emphasis added by applicants)".

From this description, it is clear that the conductive yarns of Kishimoto comprise either a non-conducting polymer fiber coated with a conductive covering layer on the surface, or a conductive wire coated with an insulating covering layer. Applicants respectfully point out that the former embodiment is not a conducting polymer fiber as is taught in the subject claimed invention. Rather, the polymer fibers described by Kishimoto comprise insulating fibers coated with a conductive layer. Unlike the present invention, this conductive layer loses its conductivity by breakage of the layer. The fibers of the present invention lose their bulk conductivity, likely from a loss of electrical conjugation of the conductive polyaniline. Thus, the conductive polyaniline fibers of the present invention are homogeneous fibers carrying current through the interior thereof rather than the coated or layered, non-conductive fibers of Kishimoto where the current is carried by the coating instead of through the interior of the fiber.

Since Kishimoto teaches away from the present claimed invention, Applicants respectfully believe that the Examiner's rejection of claims 1 and 2 under 35 U.S.C. 102(b) as being anticipated by Kishimoto is improper. Moreover, Applicants respectfully believe that the rejection of claims 3-40 as being unpatentable under 35 U.S.C. 103(a) over Kishimoto in combination with various references is likewise improper. Since Kishimoto clearly teaches away from the present claimed invention, the Examiner has incorrectly combined Kishimoto with other references, and has therefore failed to make the required *prima facie* case for an obviousness-type rejection under 35 U.S.C. 103(a).

For these reasons, applicants believe that claims 1-40, as originally filed, are in condition for allowance, and such action by the Examiner at an early date

is earnestly solicited. Reexamination and reconsideration are respectfully requested.

Respectfully submitted,

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